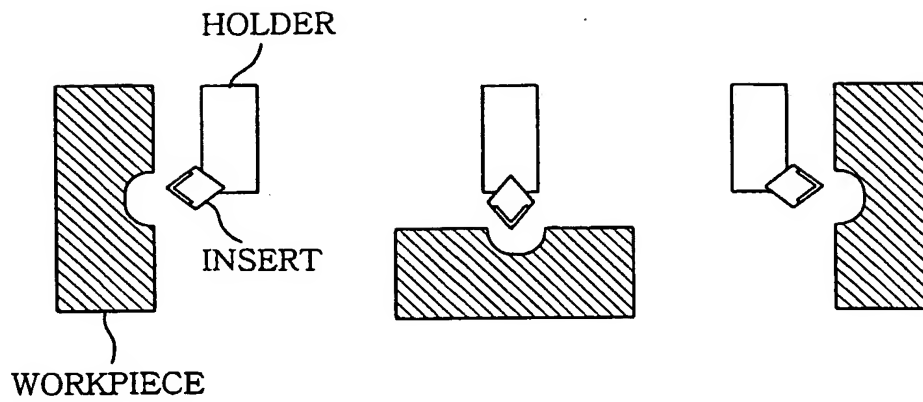
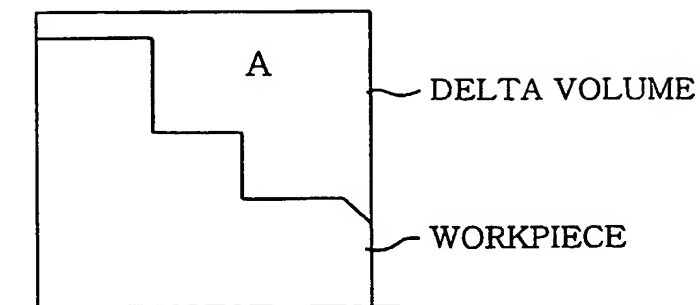
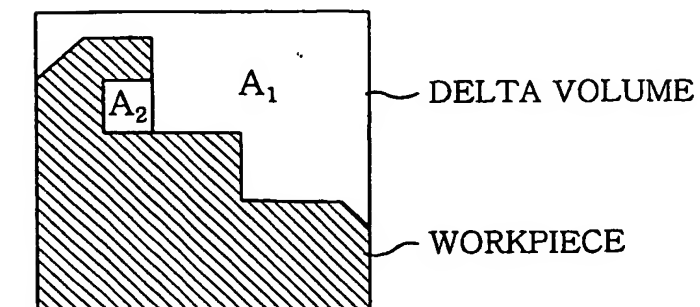
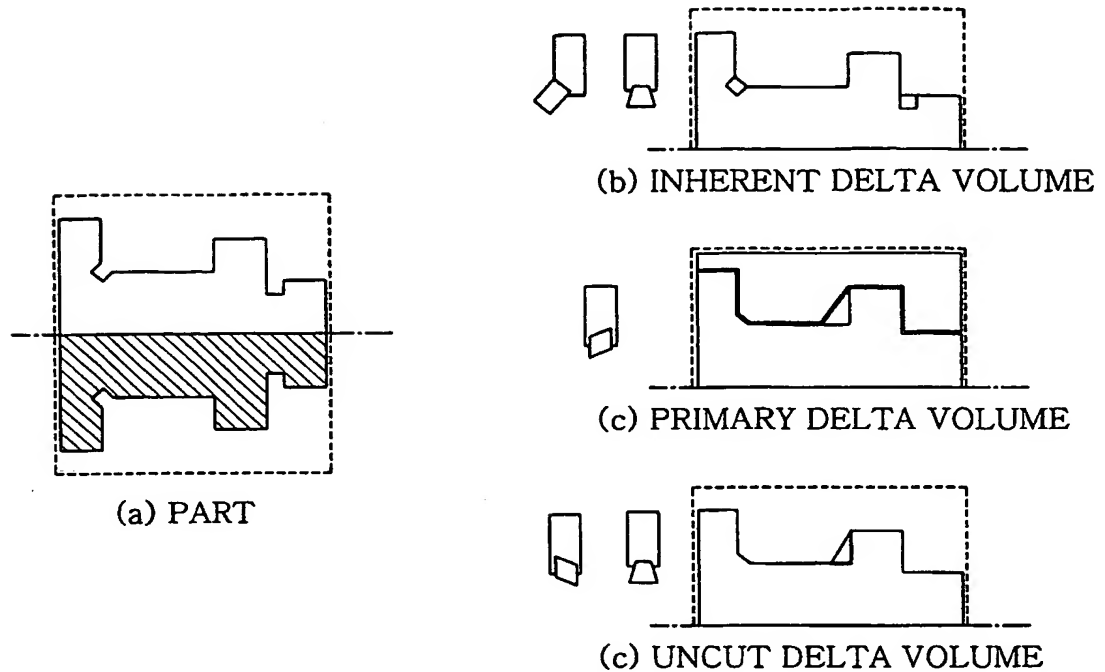
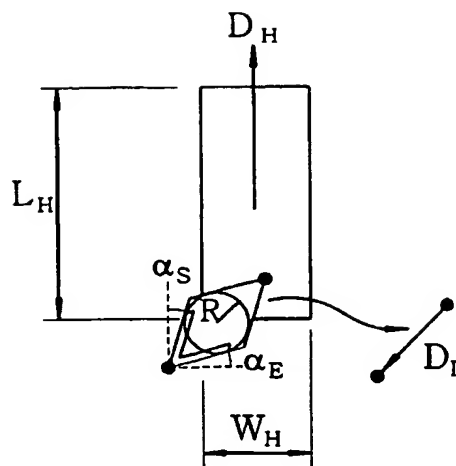


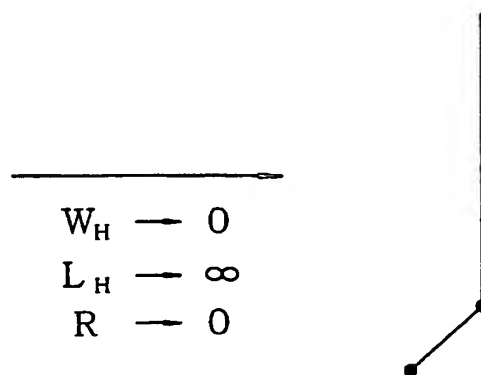
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FIG. 1**FIG. 2A****FIG. 2B**

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FIG.3**FIG.4**

(a) TURNING TOOL



(b) ABSTRACT TURNING TOOL

D_H : HOLDER DIRECTION
 L_H : HOLDER LENGTH
 W_H : HOLDER WIDTH
 D_I : INSERT DIRECTION

R : NOSE RADIUS
 α_S : SIDE CUTTING EDGE ANGLE
 α_E : END CUTTING EDGE ANGLE

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FIG.5

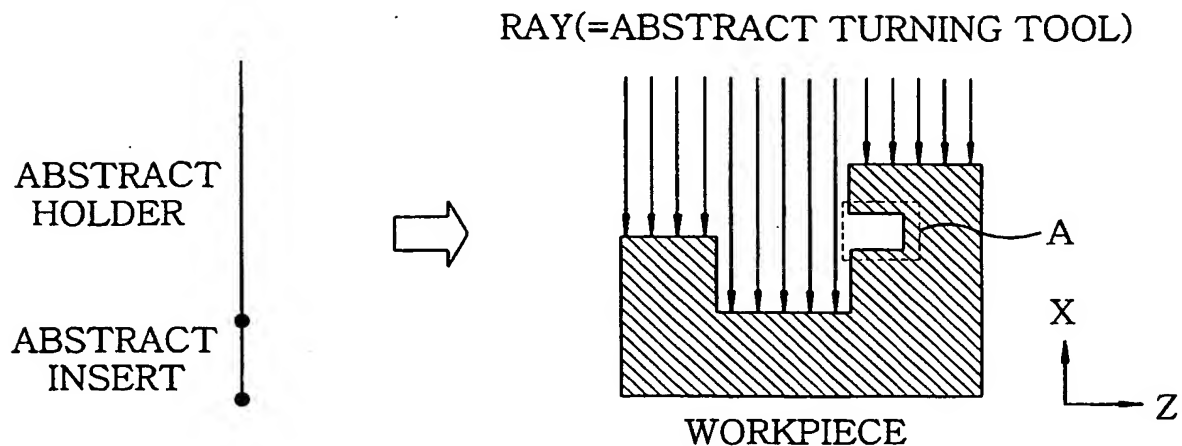


FIG.6A

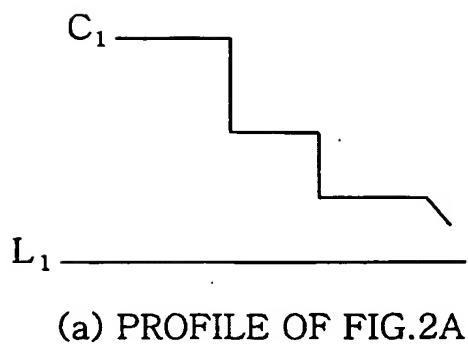


FIG.6B

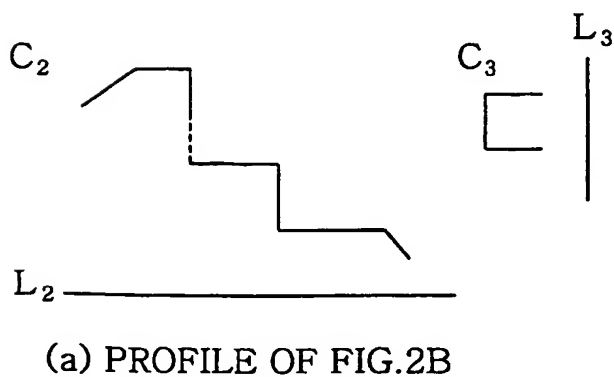


FIG. 7A

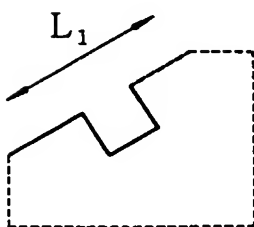


FIG. 7B

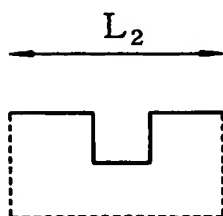


FIG. 7C

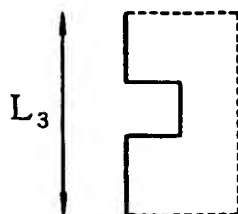


FIG. 8

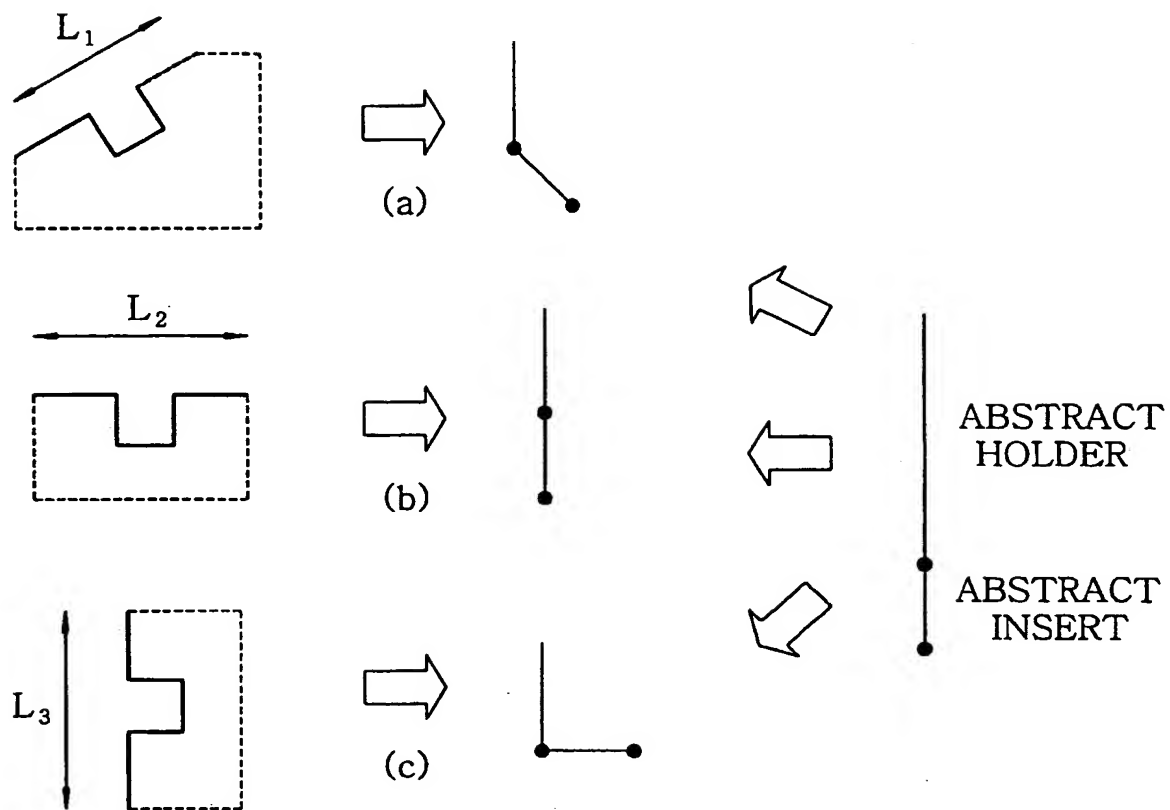


FIG. 9A

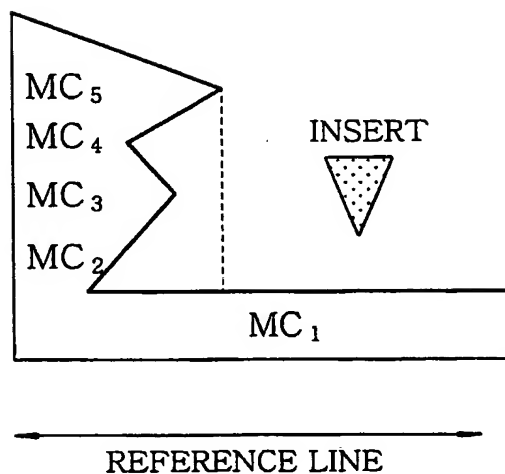
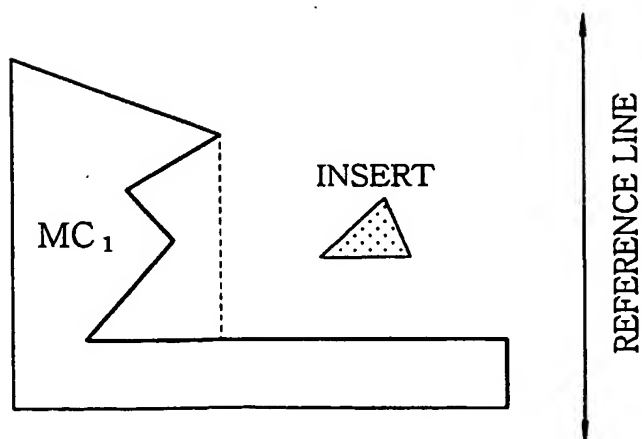
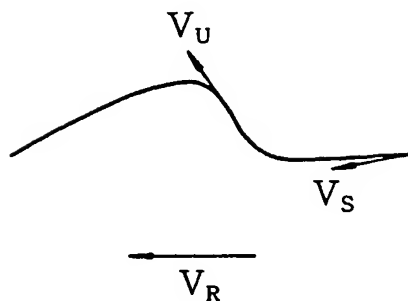


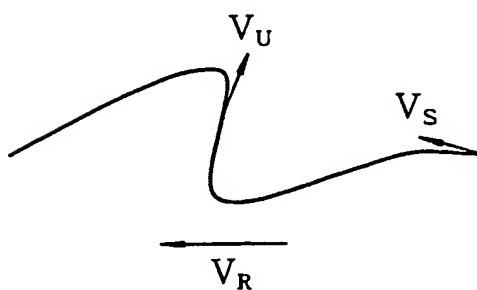
FIG. 9B



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FIG. 10A

$$\text{SIGN}(V_S \cdot V_R) = \text{SIGN}(V_U \cdot V_R)$$

FIG. 10B

$$\text{SIGN}(V_S \cdot V_R) \neq \text{SIGN}(V_U \cdot V_R)$$

FIG. 11A

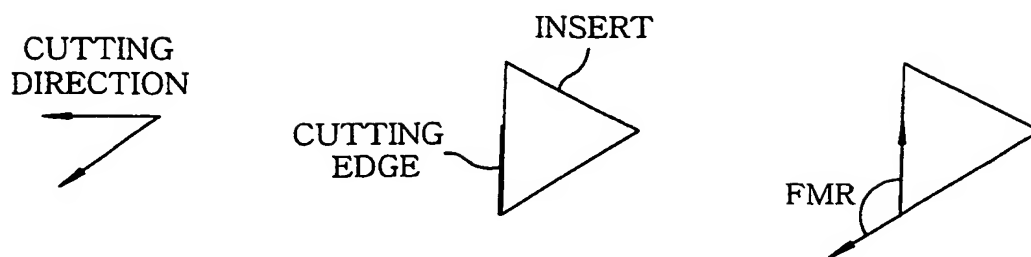


FIG. 11B

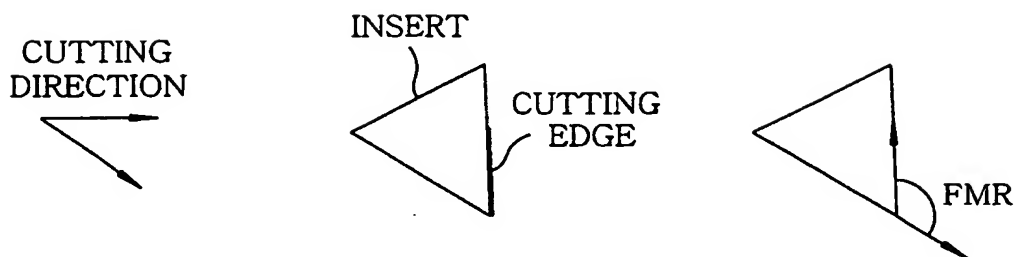
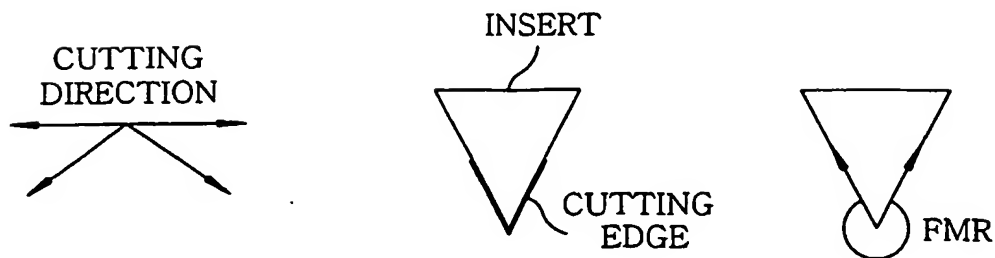


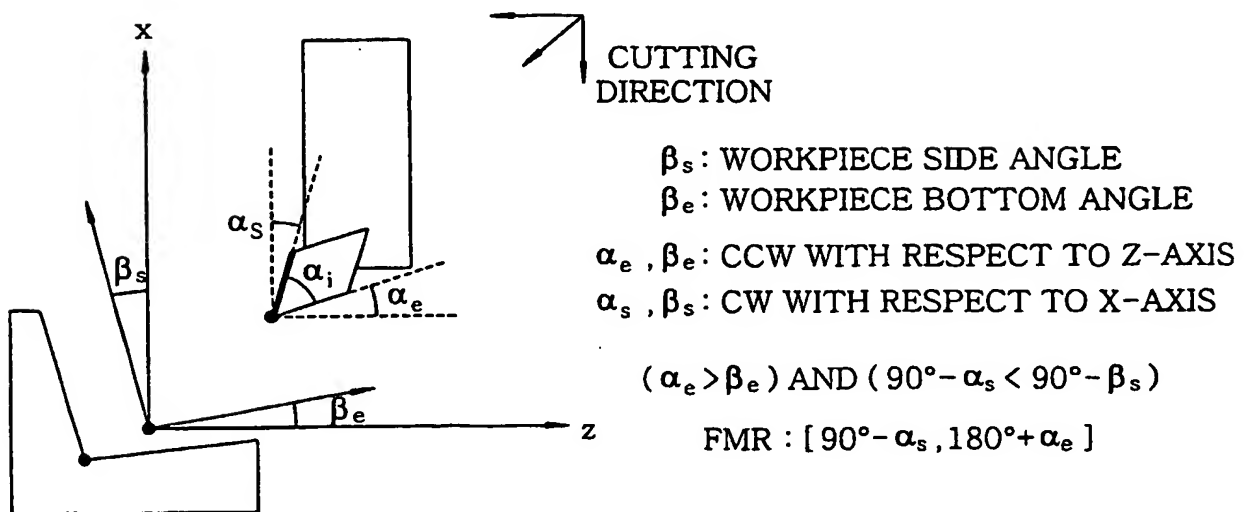
FIG. 11C



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FIG. 12A

α_i : INSERT ANGLE
 α_s : SIDE CUTTING EDGE ANGLE
 α_e : END CUTTING EDGE ANGLE

FIG. 12B

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FIG. 13A

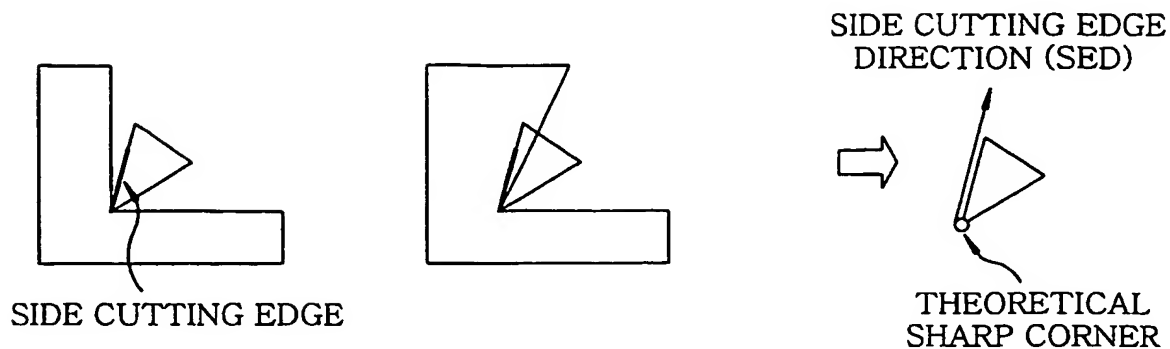


FIG. 13B

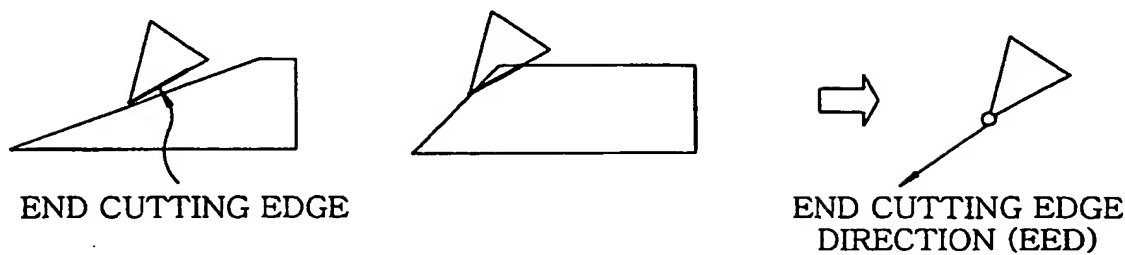


FIG. 14

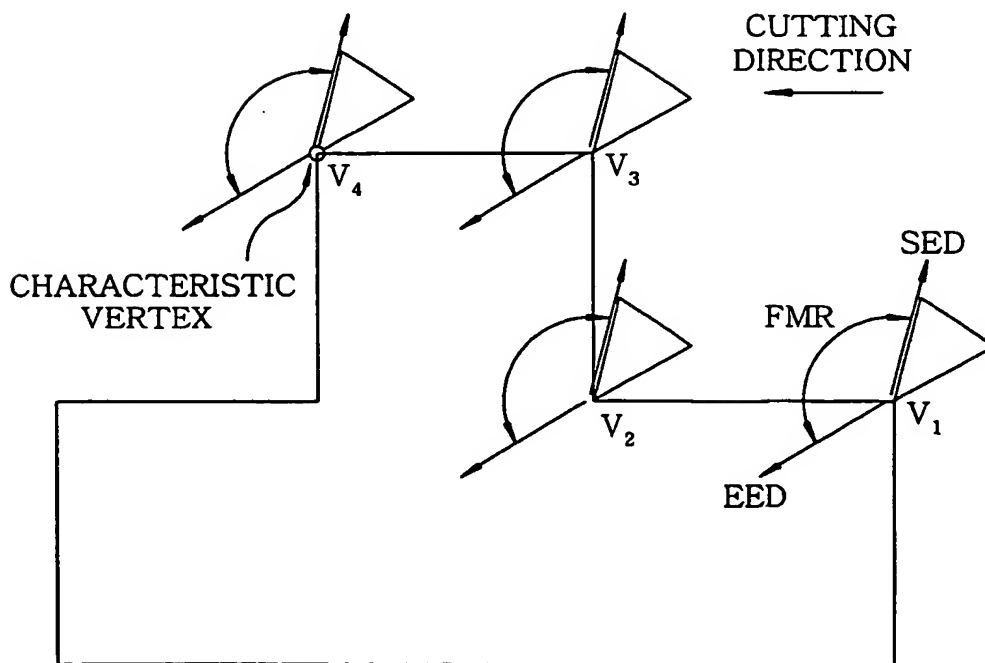


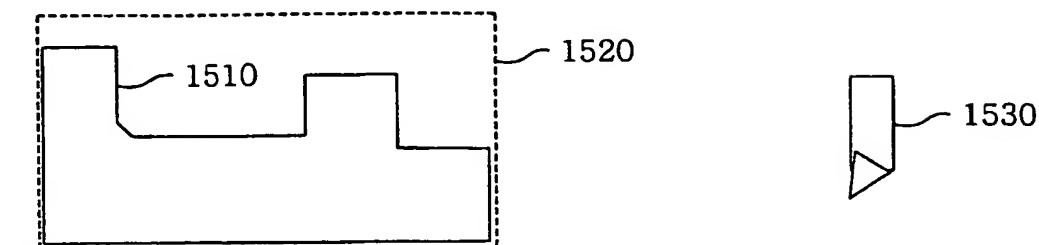
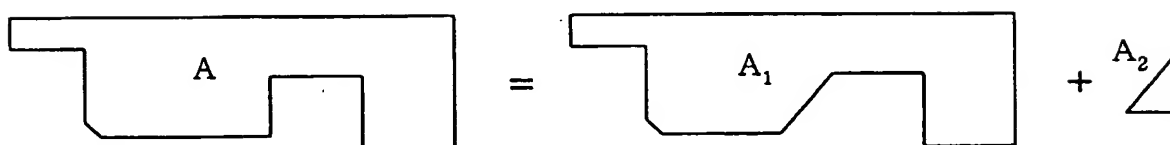
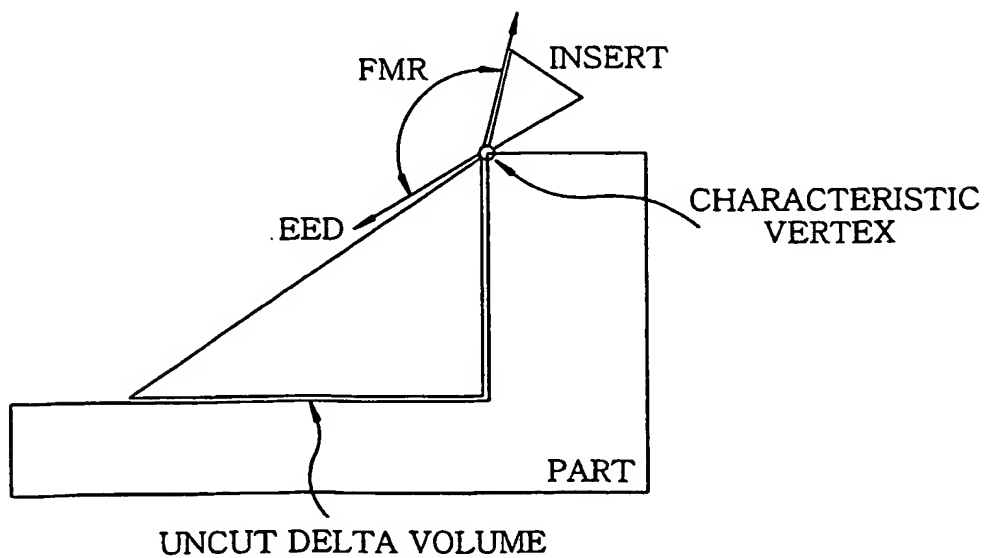
FIG. 15A*FIG. 15B**FIG. 16*

FIG. 17

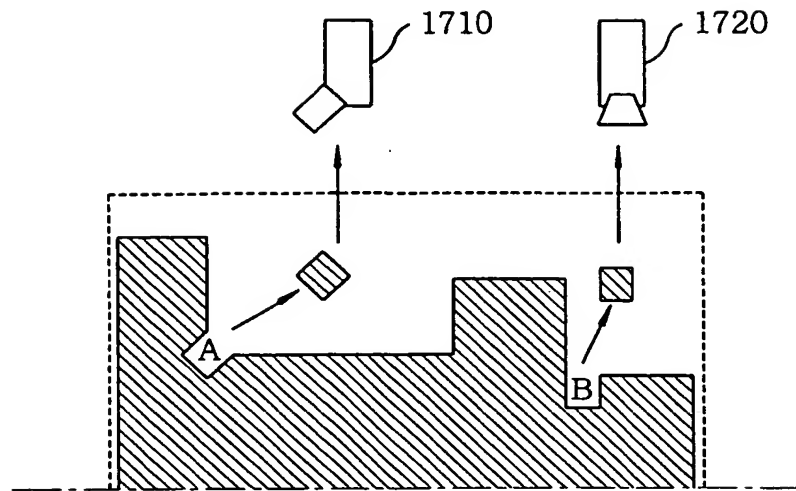


FIG. 18A

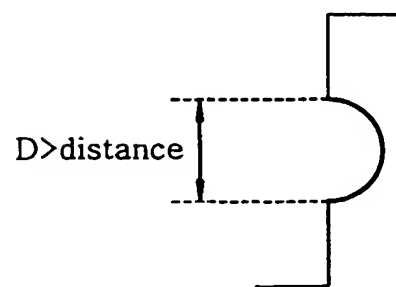
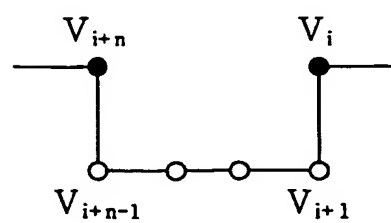


FIG. 18B



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FIG. 19A

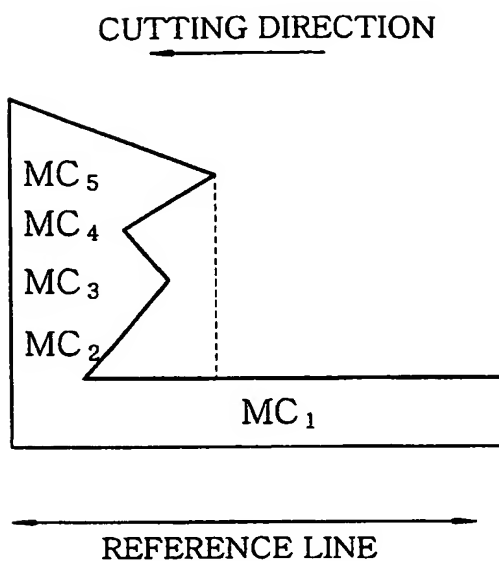


FIG. 19B

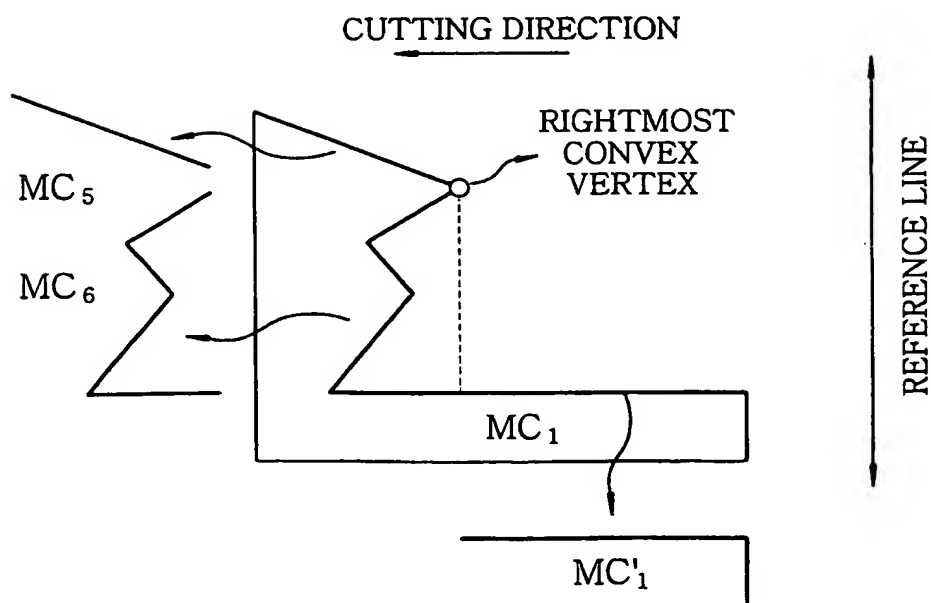


FIG.20A

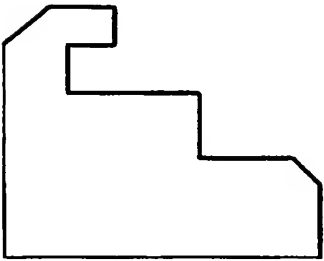
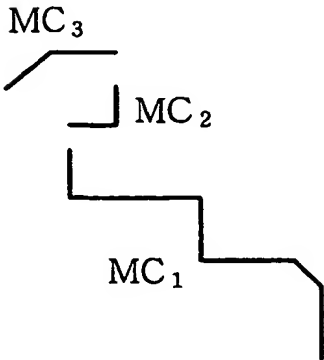
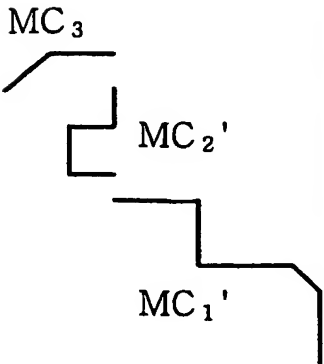


FIG.20B



REFERENCE LINE
(MC₁,MC₂,MC₃)

FIG.20C



REFERENCE LINE
(MC₁',MC₃)

REFERENCE LINE
(MC₂')

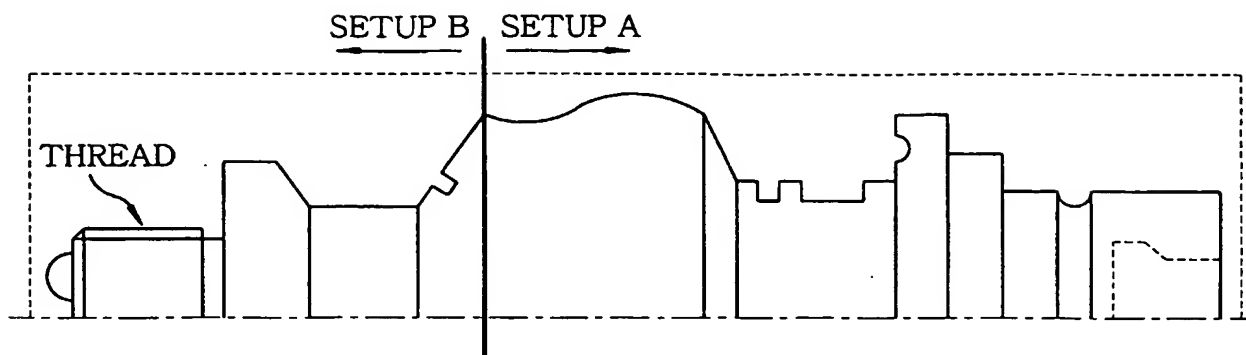
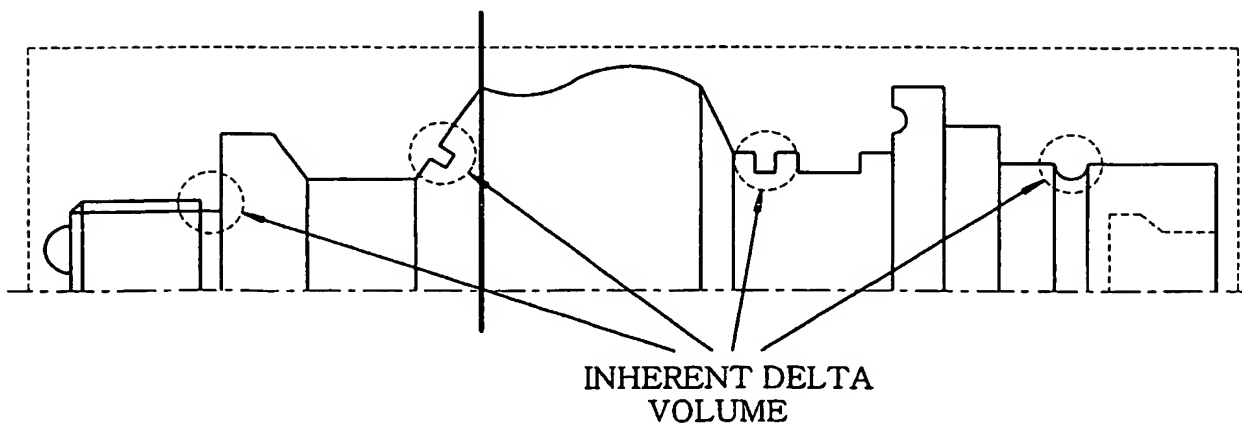
FIG. 21A*FIG. 21B*

FIG. 21C

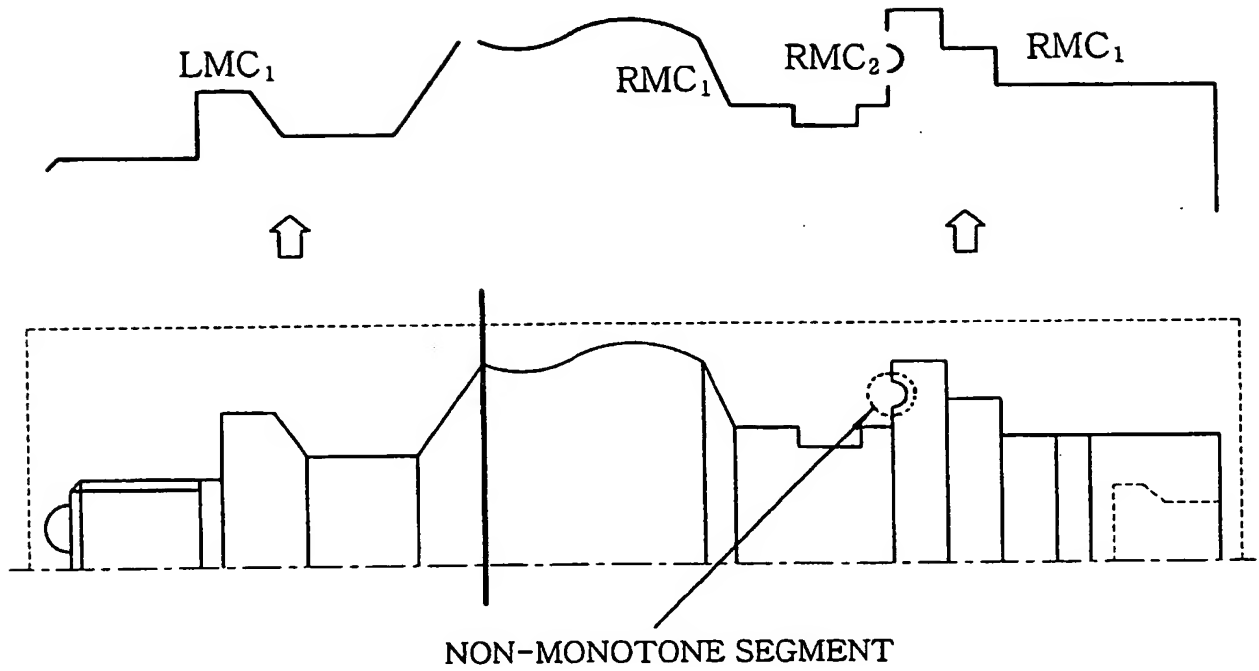
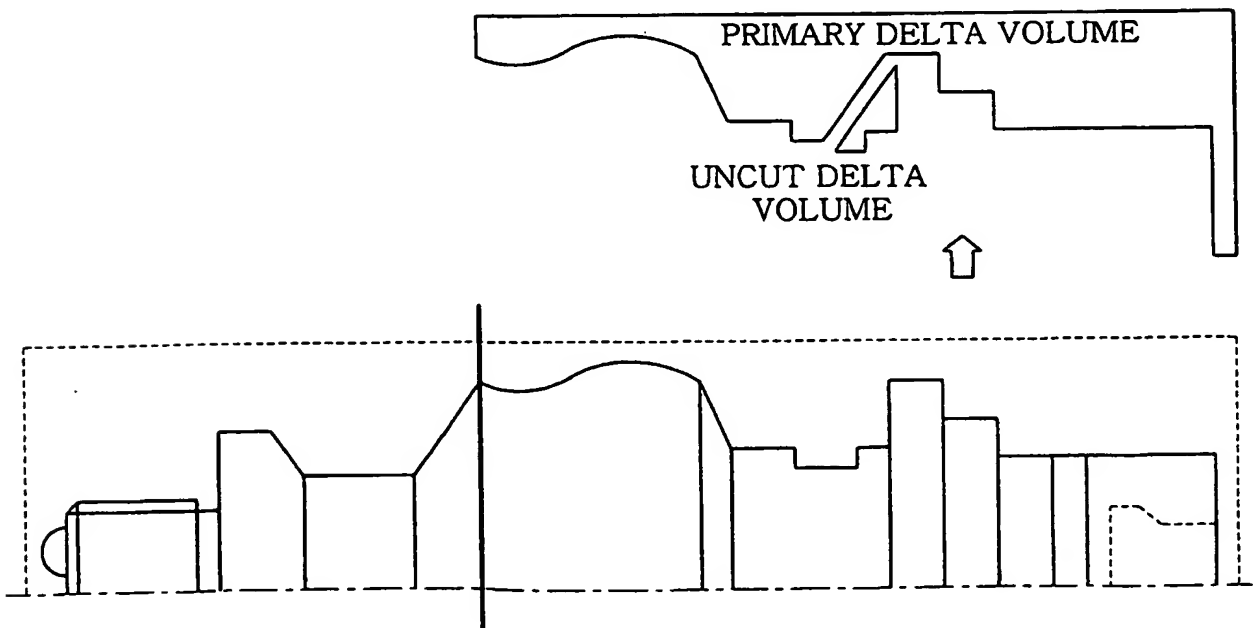
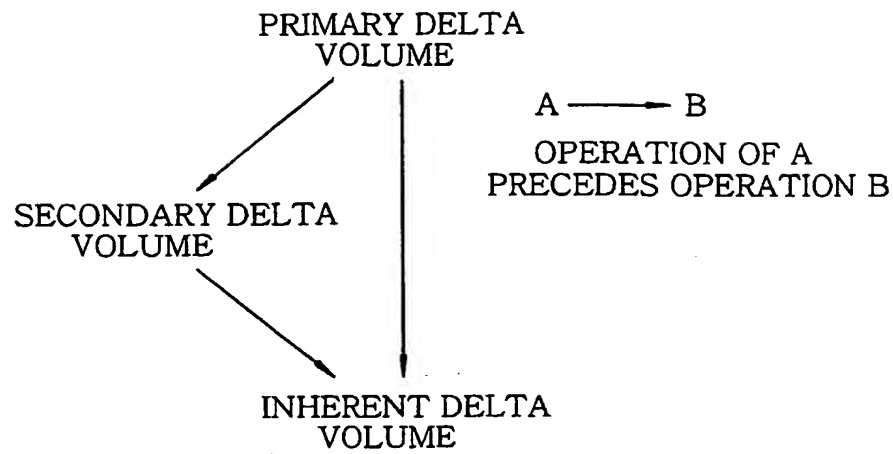
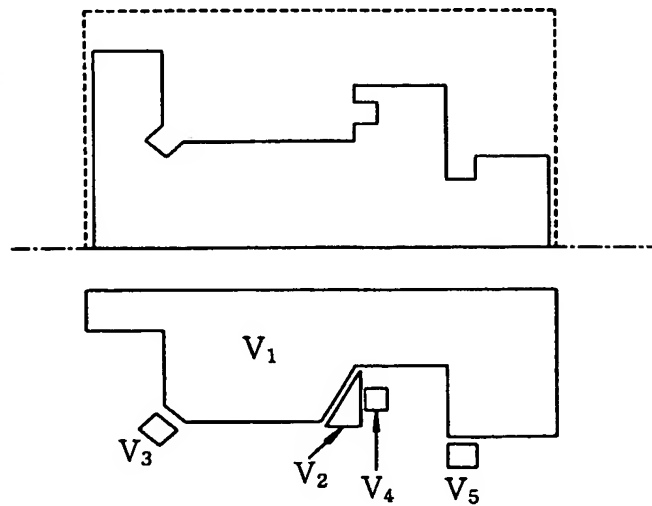
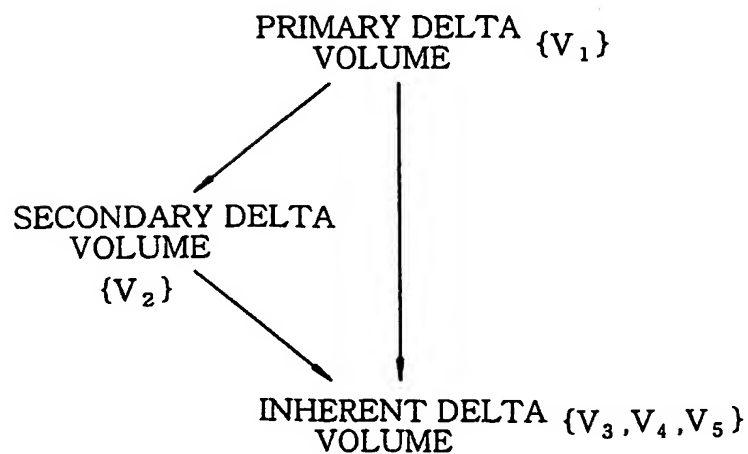


FIG. 21D



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FIG.22**FIG.23A****FIG.23B**

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FIG.24

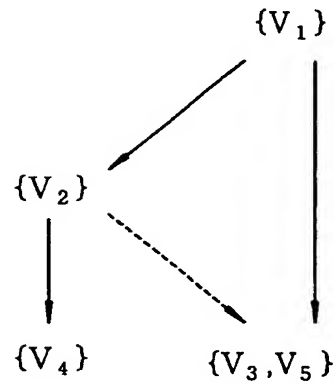


FIG.25A

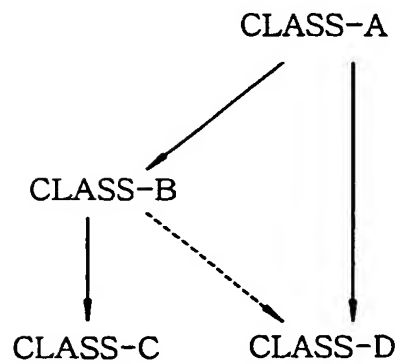


FIG.25B

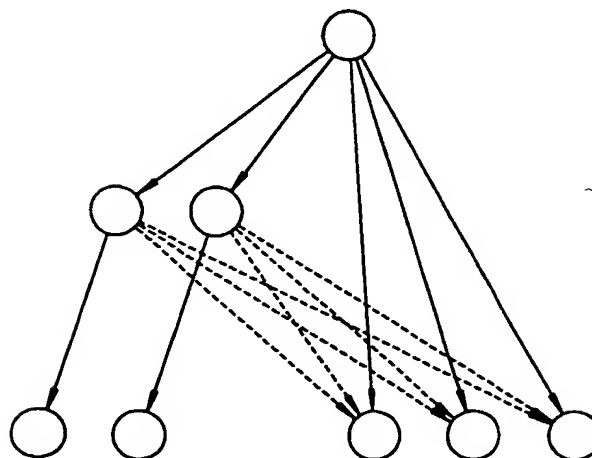


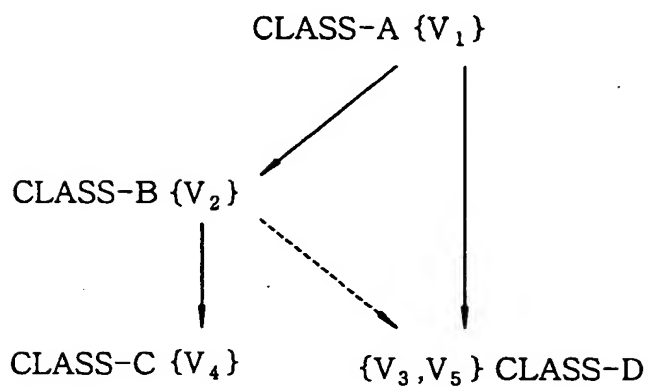
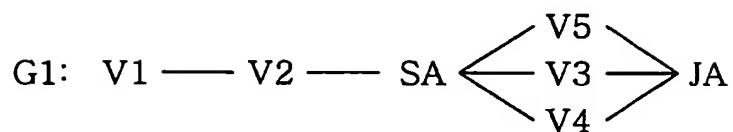
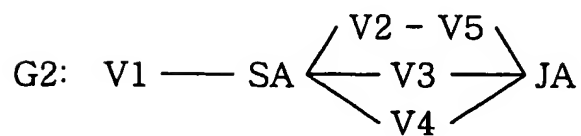
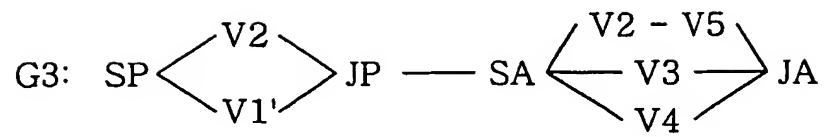
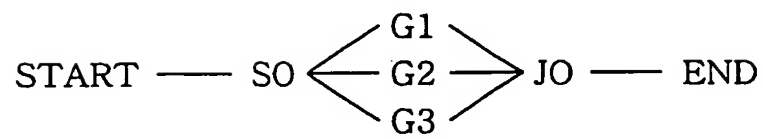
FIG.26A**FIG.26B****FIG.26C**

FIG.26D*FIG.26E*

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FIG. 27A

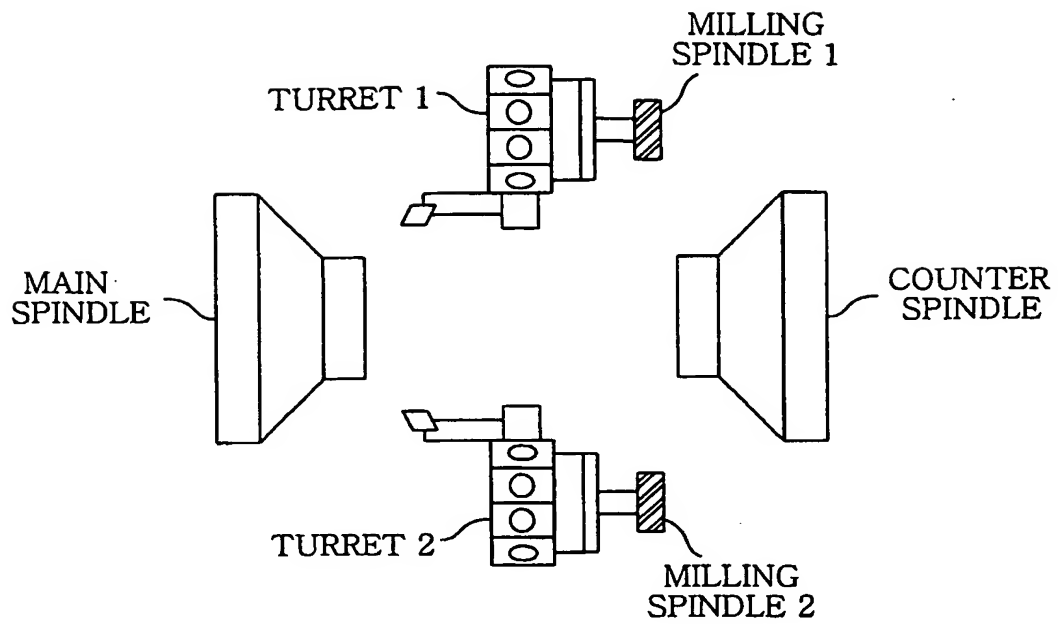


FIG. 27B

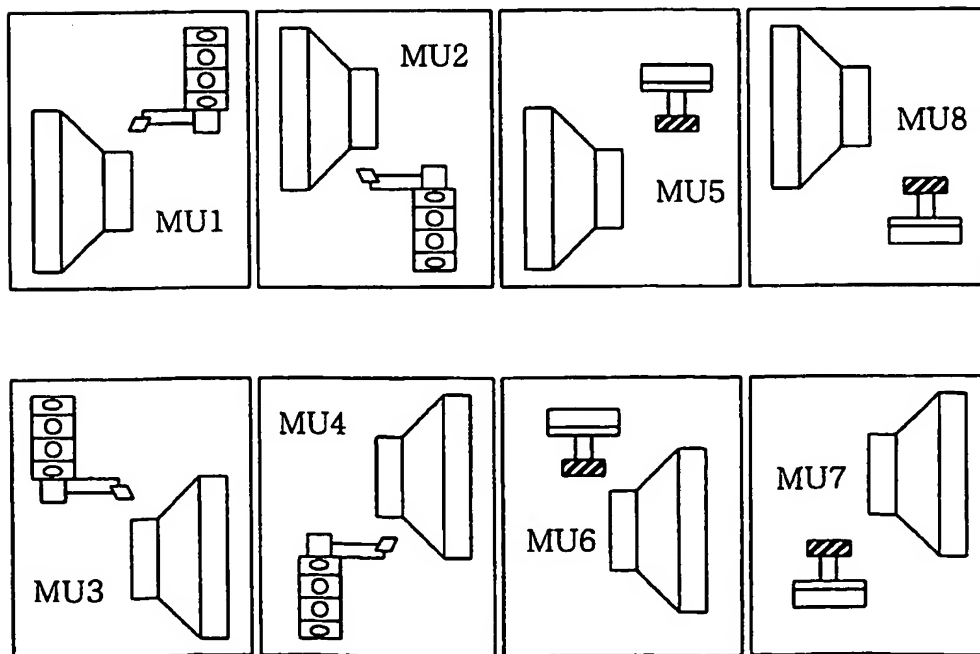


FIG. 28

OPERATION #	FEATURE #	Op. DESCRIPTION	PREDECESSOR	TIME
11	1	FACING	42	5
12	2	ROUGH CONTOURING	11	10
13	2	FINISH CONTOURING	12	8
14	3	GROOVING	41 or 42	2
15	4	GROOVING	41 or 42	2
16	5	ROUGH CONTOURING	18	15
17	5	FINISH CONTOURING	16	10
18	6	FACING	41	5
21	7	INNER CONTOURING	42	5
31-1,31-2	8,9	MILLING	13	8x2
33	10	MILLING	41 or 42	3
32-1,32-2, 32-3,32-4	12,13,14,15	MILLING	17	3x4
22	16	GROOVING	13	2
23	17	GROOVING	13	2
24	18	GROOVING	17	2
25	19	GROOVING	17	2
41	NONE	CLAMPING (SETUP)	NONE	5
42	NONE	CLAMPING (SETUP)	NONE	5

FIG. 29A

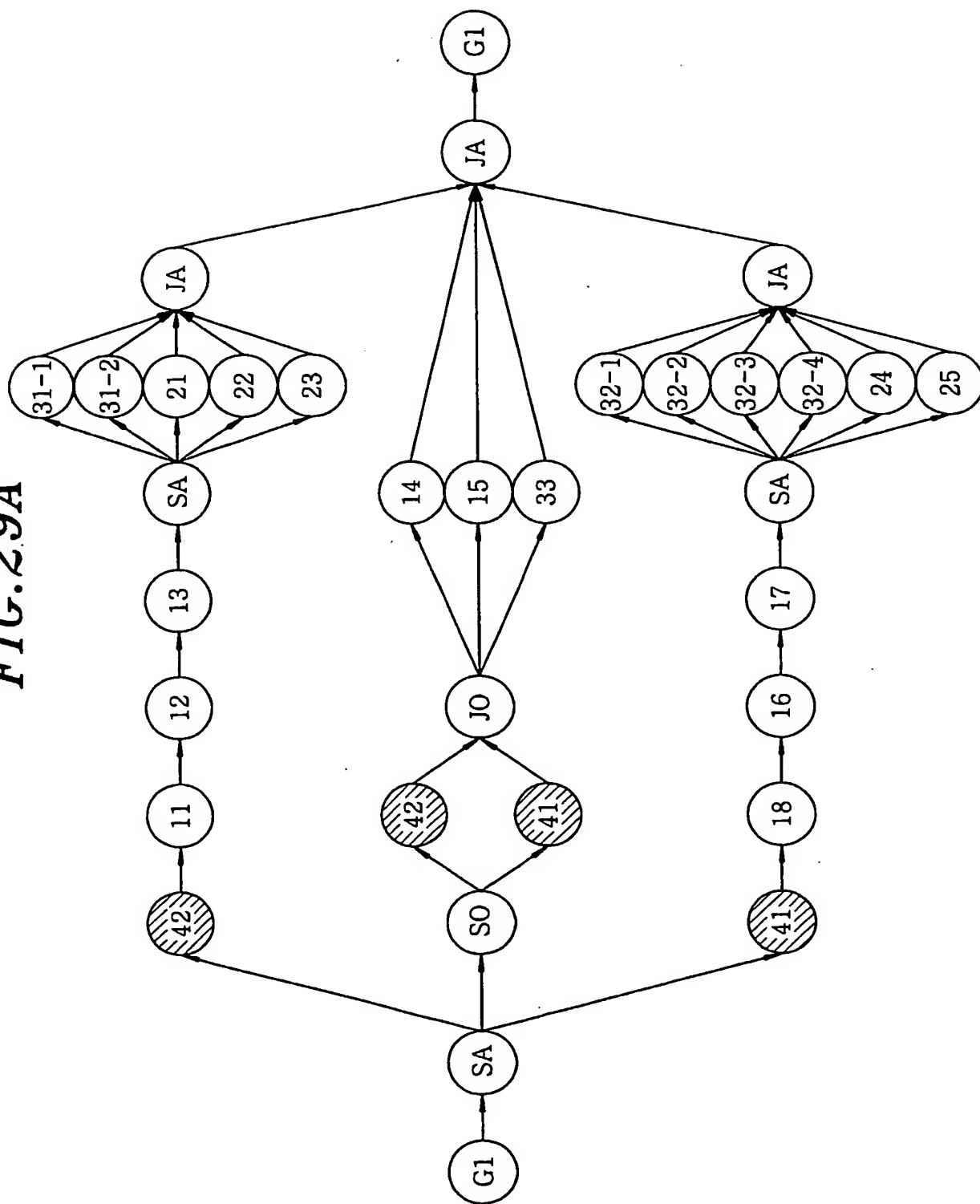


FIG.29B

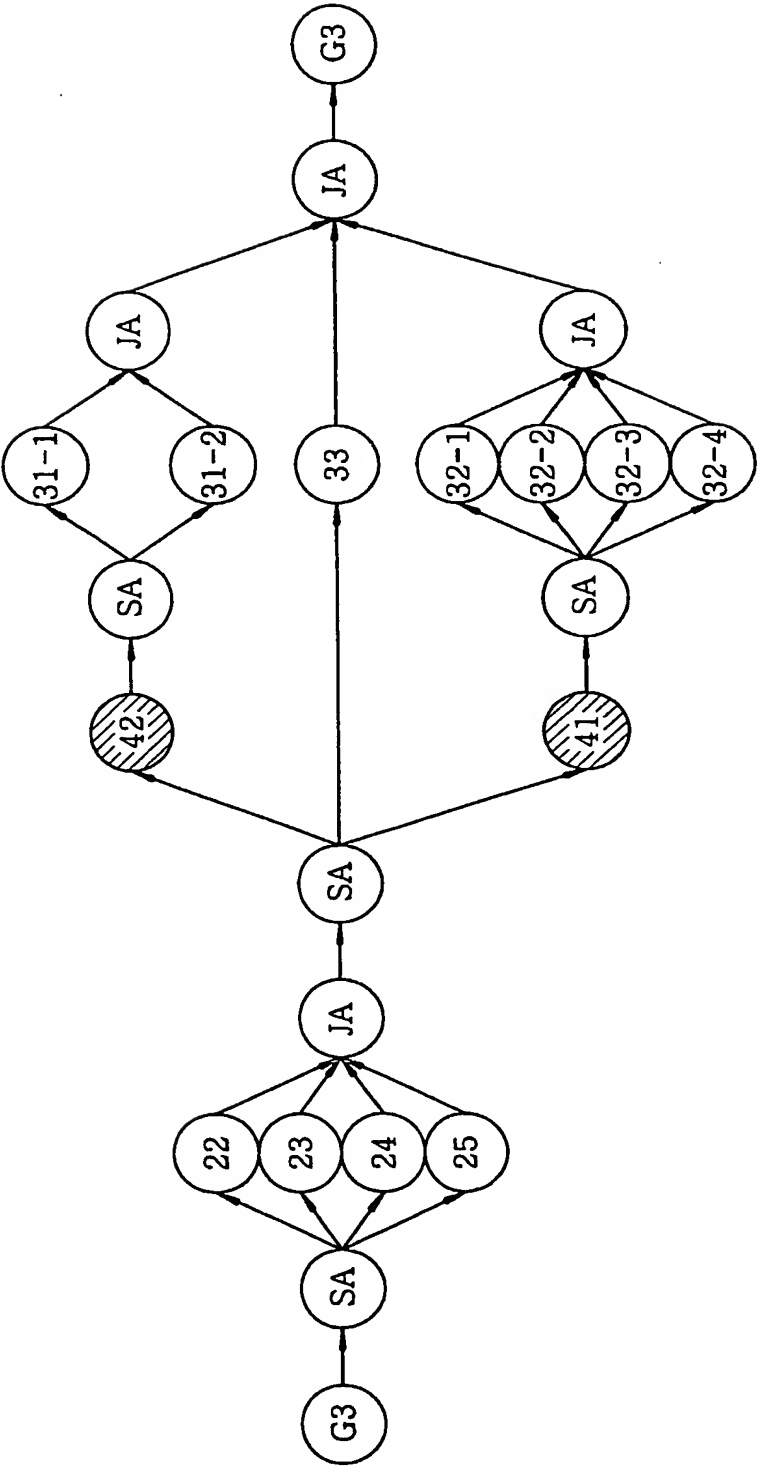


FIG.29C

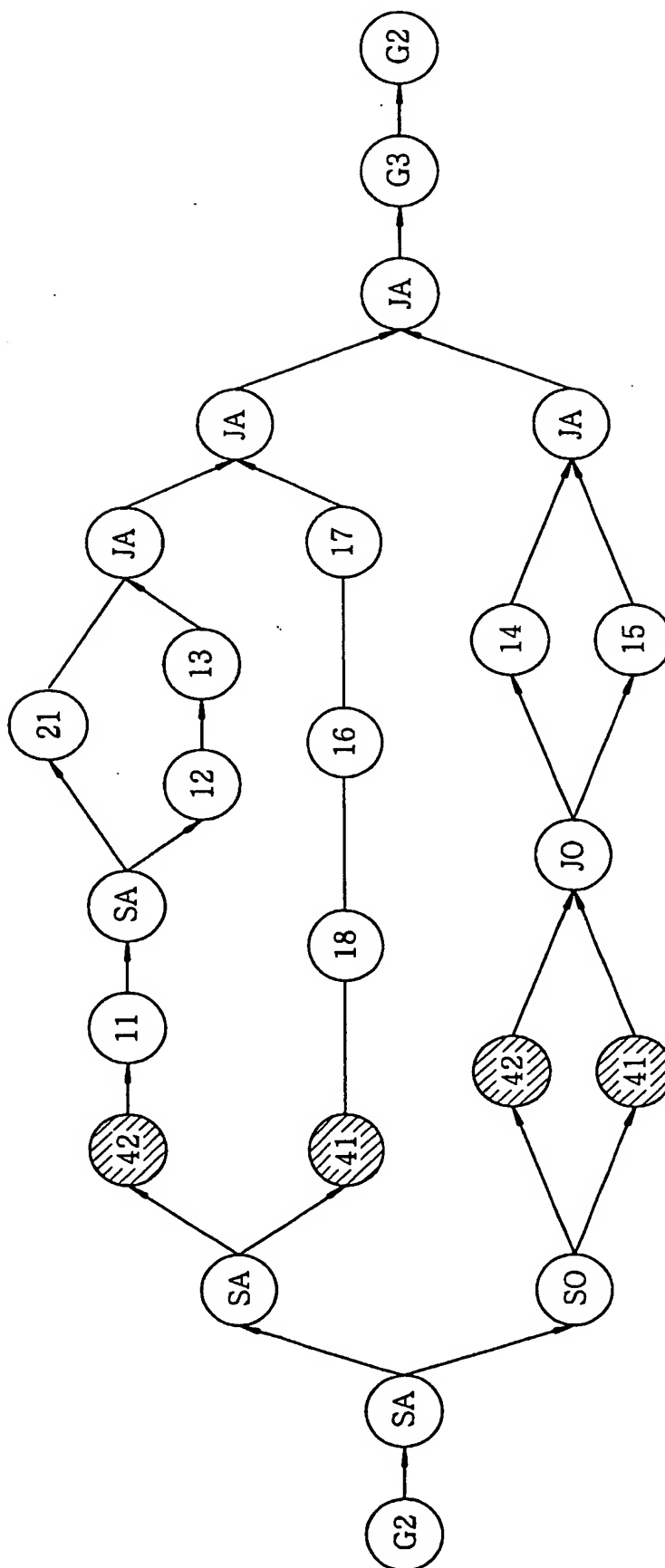


FIG. 29D

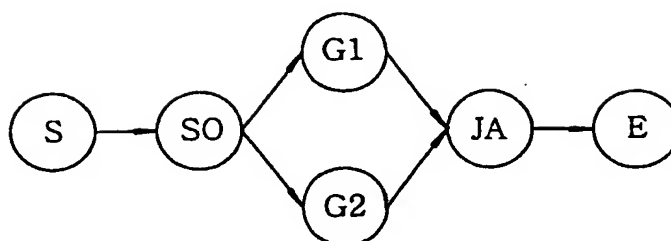


FIG.30

MU	TIME									
MU1	18	16			17					
MU2	1 4									
MU3	11	12		13		21				
MU4	1 5									
MU5								32-1,32-2,32-3,32-4		
MU6								31-1,31-2		

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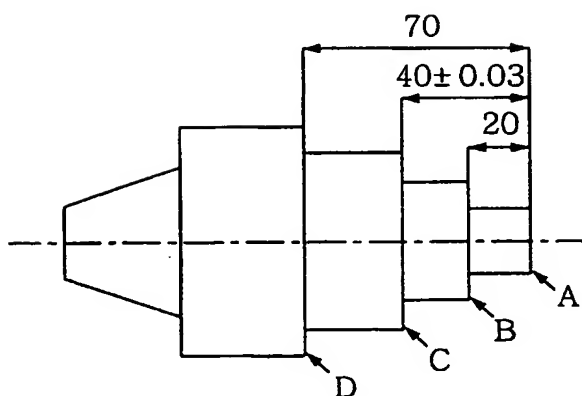
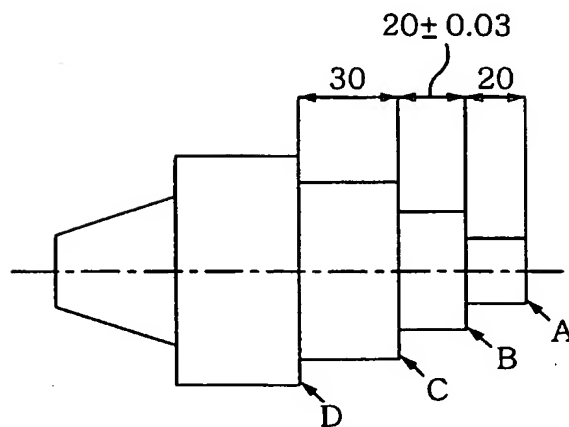
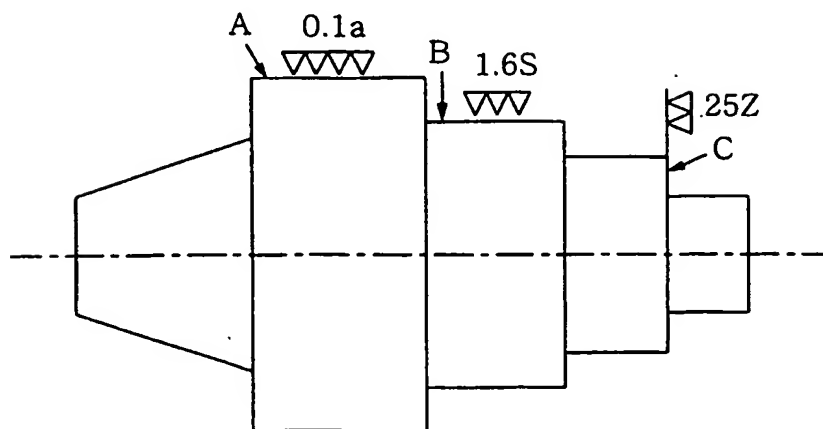
*FIG.31A*TOLERANCE: ± 0.1 *FIG.31B*TOLERANCE: ± 0.1 *FIG.32*

FIG.33

R _a	R _{max}	R _z	symbol
0.013a	0.05S	0.05Z	▽▽▽▽
0.025a	0.1S	0.1Z	
0.05a	0.2S	0.2Z	
0.10a	0.4S	0.4Z	
0.20a	0.8S	0.8Z	
0.40a	1.6S	1.6Z	▽▽
0.80a	3.2S	3.2Z	
1.6a	6.3S	6.3Z	
3.2a	12.5S	12.5Z	▽▽
6.3a	25S	25Z	
12.5a	50S	50Z	▽
25a	100S	100Z	

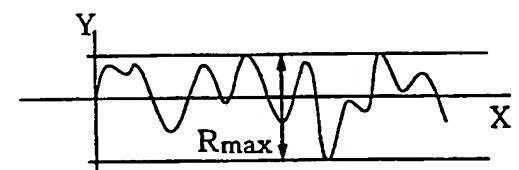
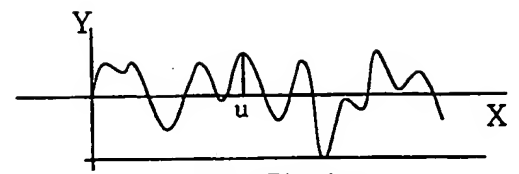
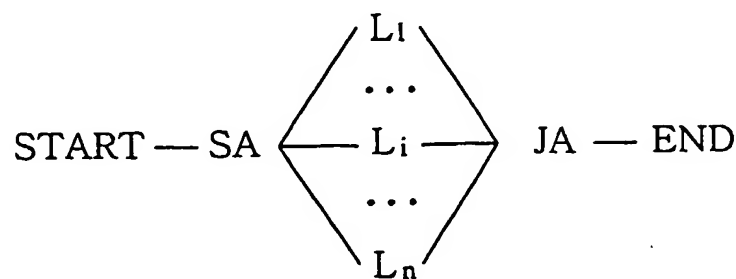


FIG.34



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FIG.35A

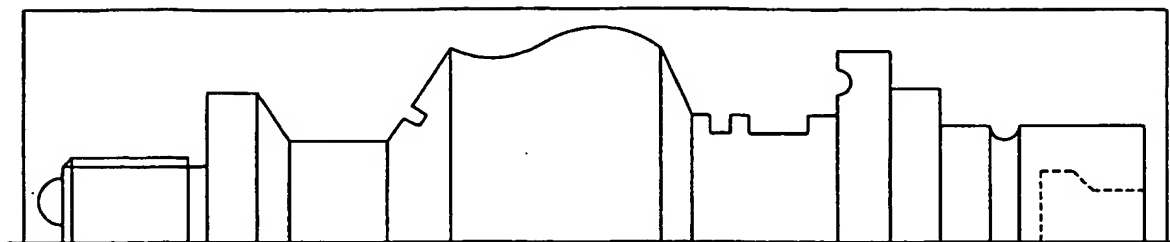


FIG.35B

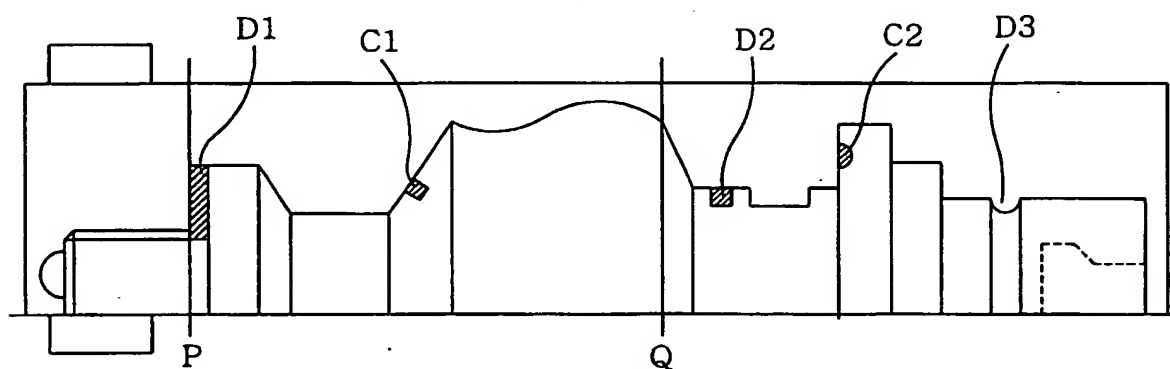


FIG.35C

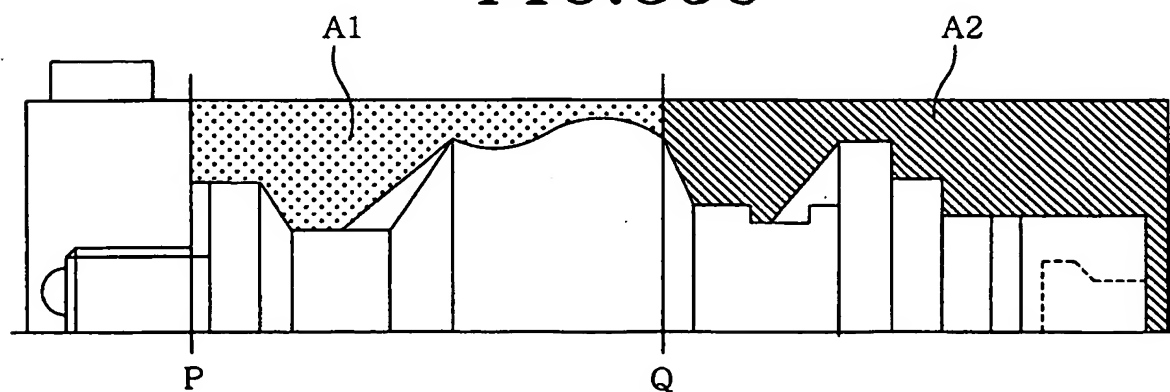
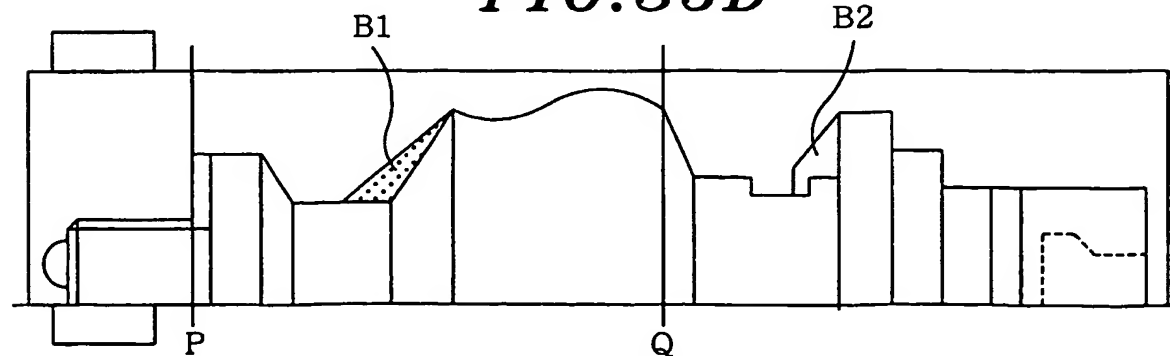


FIG.35D



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FIG.35E

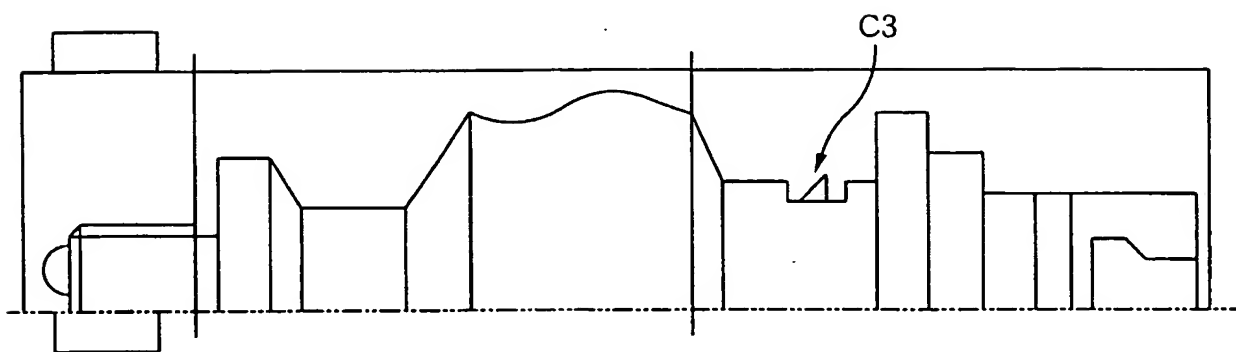
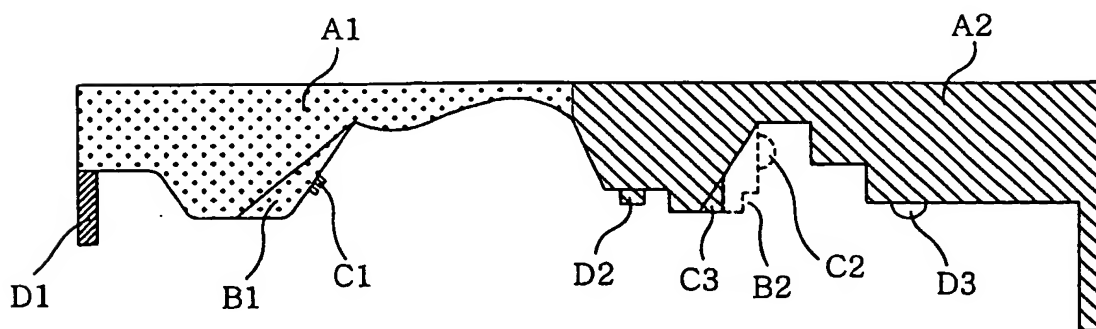


FIG.35F



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FIG.36A

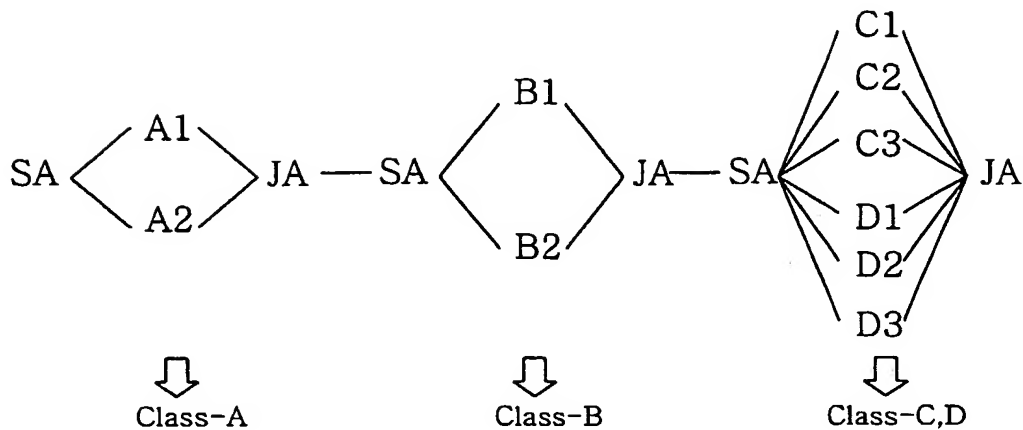
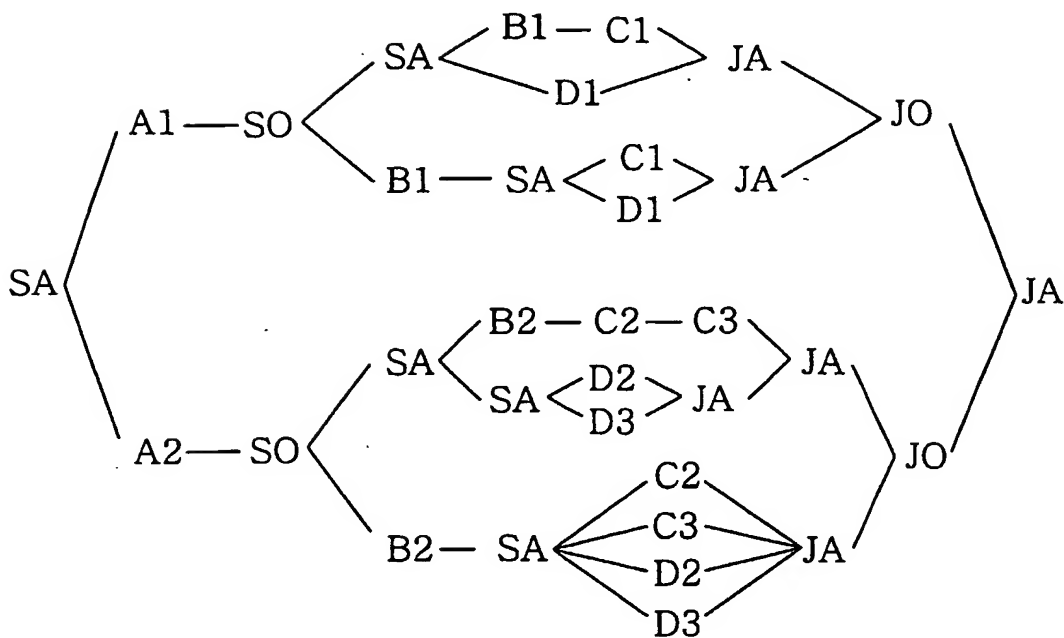


FIG.36B



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FIG.36C

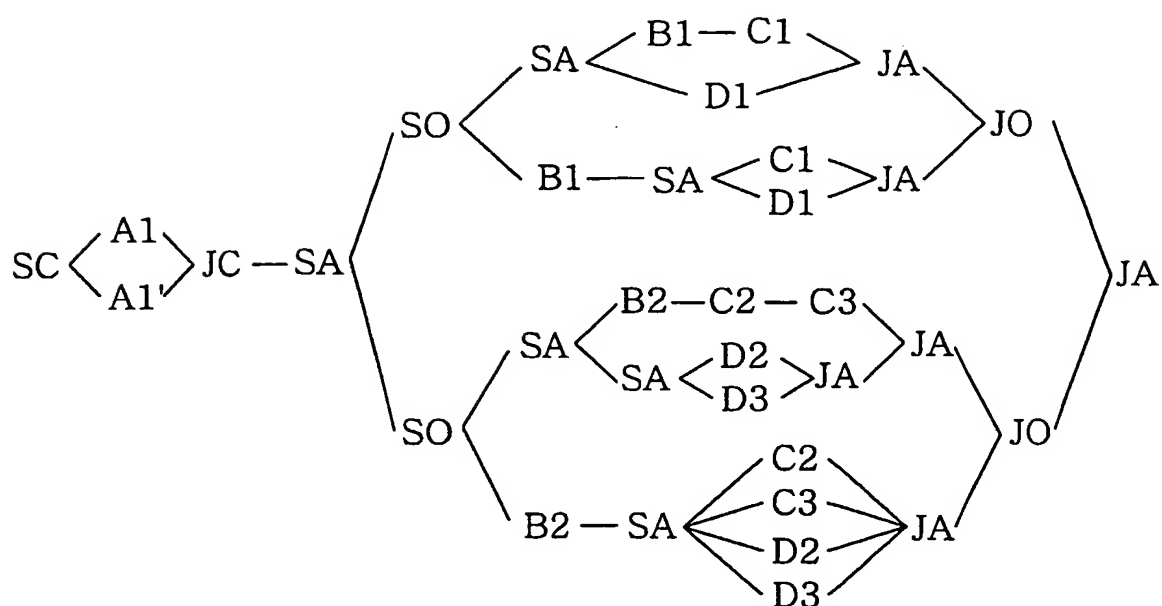
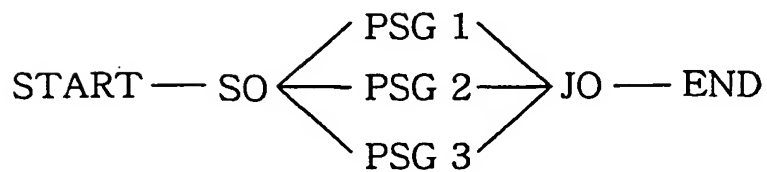
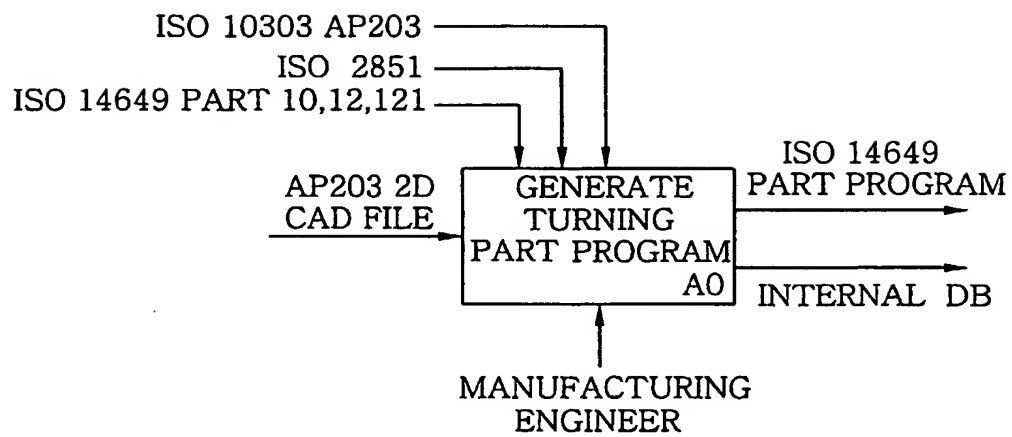


FIG.36D

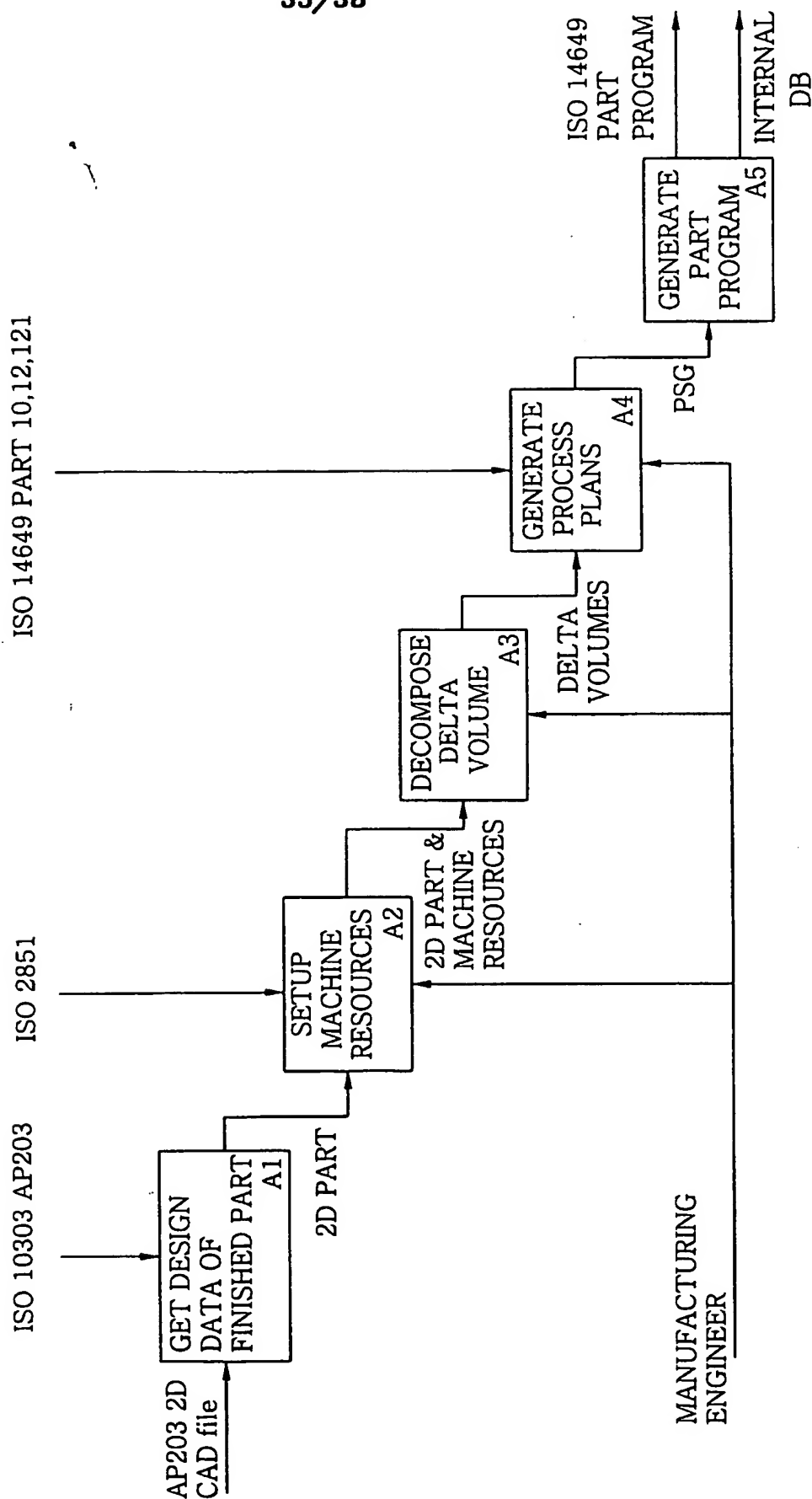


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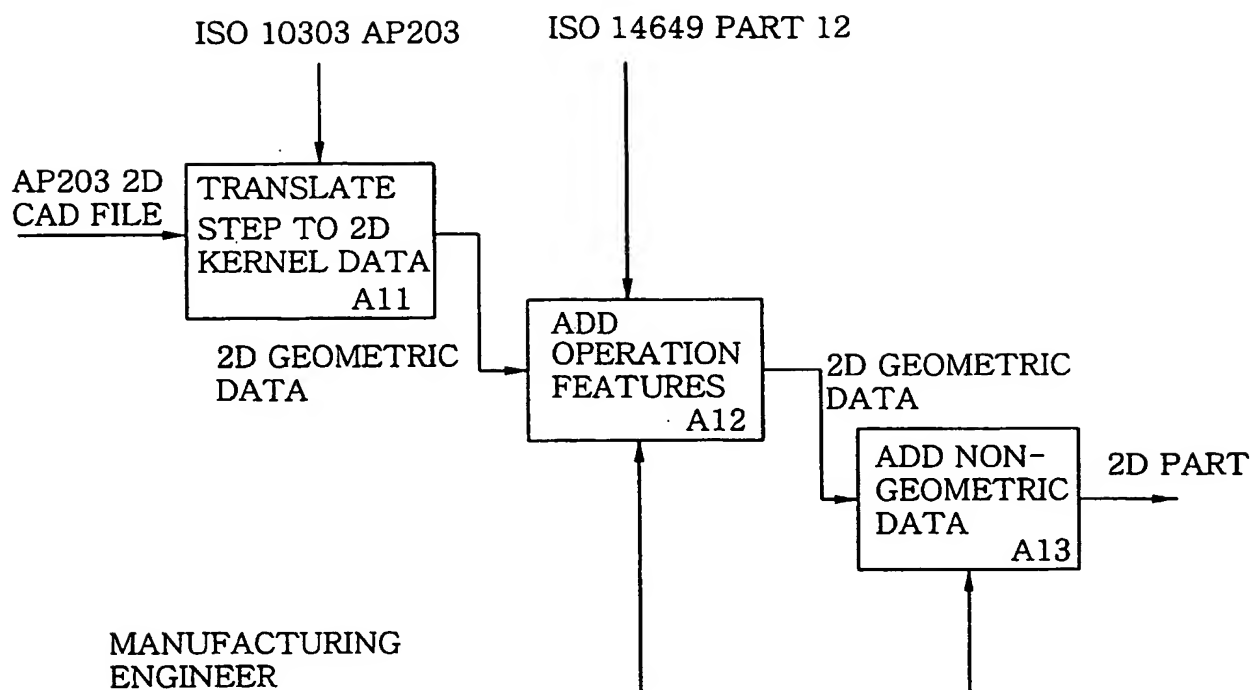
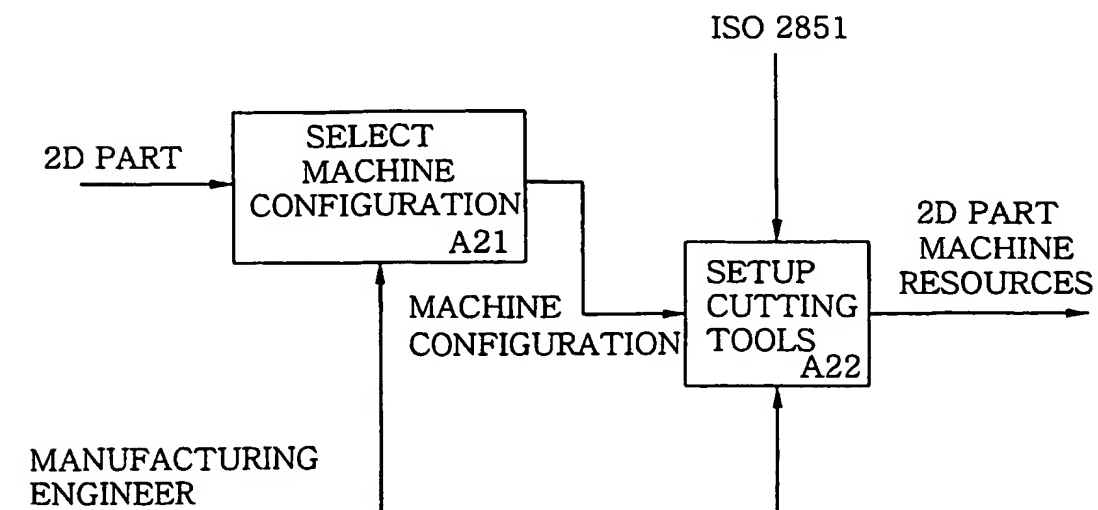
FIG.37

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FIG. 38



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FIG. 39*FIG. 40*

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FIG. 41

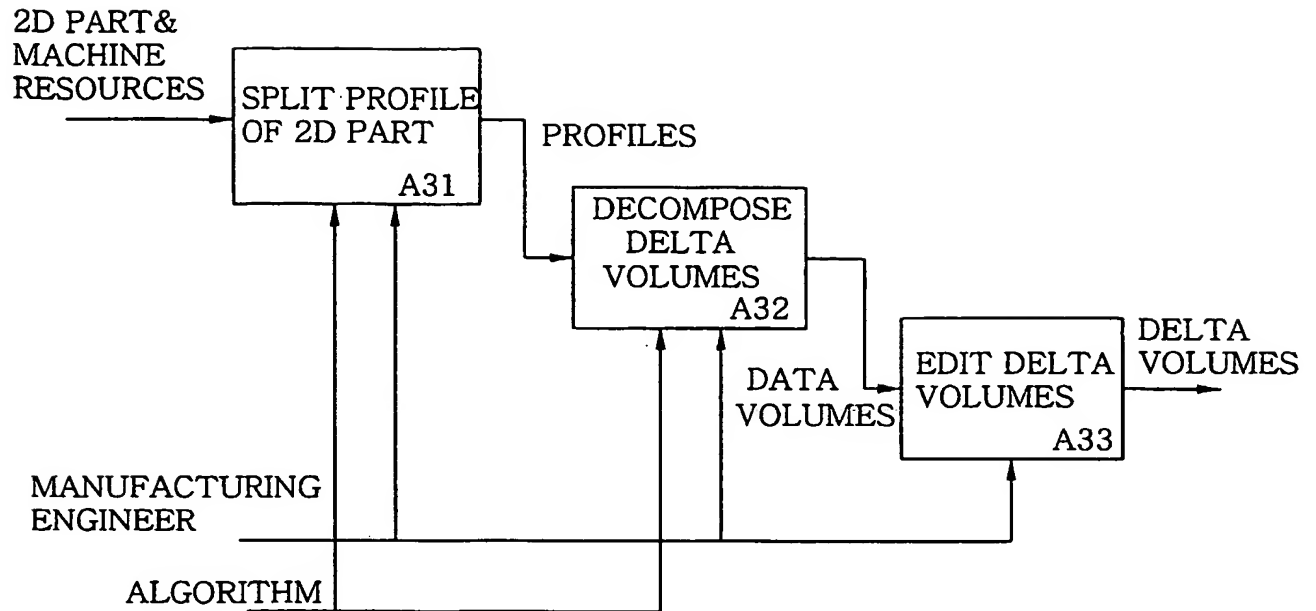


FIG. 42

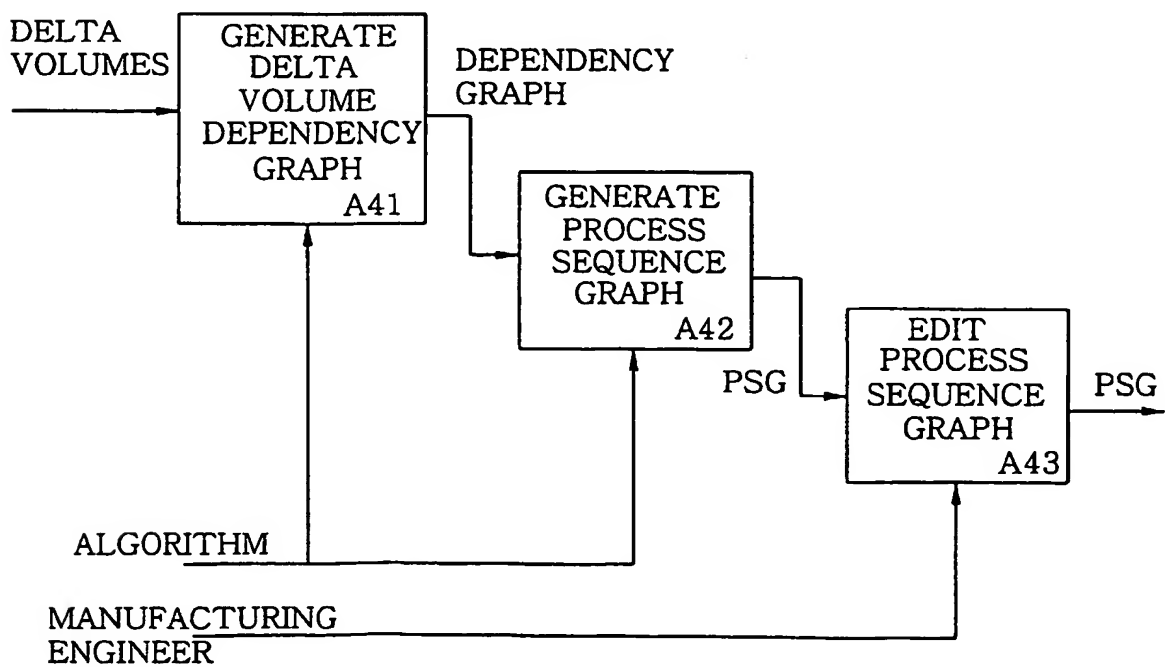


FIG. 43

